Tsunami Sources 1610 B.C. to A.D. 2017

from Earthquakes, Volcanic Eruptions, Landslides, and Other Causes

NOAA/NCEI WDS Tsunami Source Events

Effects of the Tsunami	Volcanic Eruption	Landslide	Unknown Cause	Earthquake Magnitude >=9	>=8	>=7	>=6	Not recorded
Very Many Deaths (~1001 or more deaths)	▲	■	?	●	●	●	●	●
Many Deaths (~101 to 1000 deaths)	▲	■	?	●	●	●	●	●
Some Deaths (~51 to 100 deaths)	▲	■	?	●	●	●	●	●
Few Deaths (~1 to 50 deaths)	▲	■	?	●	●	●	●	●
No Deaths	△	□	?	○	○	○	○	○

Plate Boundaries

Divergent — Convergent — Transform

Feb 2018

NOAA's National Centers for Environmental Information (NCEI) and co-located World Data Service (WDS) for Geophysics and the International Tsunami Information Center (ITIC), a UNESCO/IOC-NOAA partnership, have collaborated to produce a map showing tsunami sources. The information comes from the NCEI Global Historical Tsunami Database that includes information on tsunami source events throughout the world that range in date from 1610 B.C. to A.D. 2017. The tsunami definitions are from the Tsunami Glossary 2016 published by UNESCO IOC.

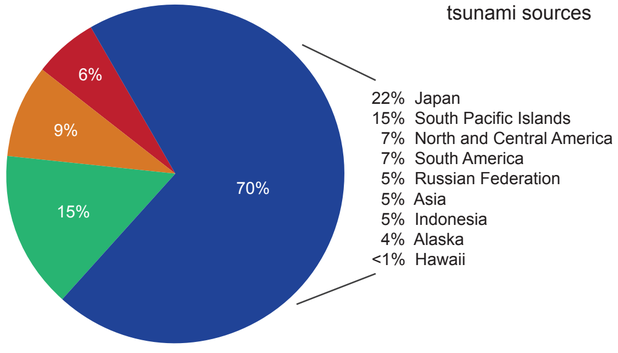
Of the 2,500 events in the NCEI Global Historical Tsunami Database, over 1,200 confirmed tsunami source events are displayed on the map. A total of 252 confirmed deadly tsunamis have resulted in over 540,000 known (or confirmed) deaths. The death total may include deaths from the generating event (e.g., earthquake) as it is not always possible to separate deaths from the different causes. These figures should be much higher, but in many events the actual number of fatalities is not known. The reporting of deadly tsunamis is not homogeneous in space or time, particularly for periods prior to the 1900s.

Tsunamis are also classified by how far away the effects of the waves were observed. For example, the effects of a local tsunami are confined to coasts within about 100 km (62 miles) or less than 1 hour tsunami travel time from its source. A tsunami capable of destruction within 1,000 km (621 miles) or 1-3 hours travel time from its source is considered a regional tsunami. Most destructive tsunamis can be classified as local or regional. It follows that many tsunami-related deaths and considerable property damage result from these tsunamis (Table 1). In fact, 90% of all tsunami deaths in the historic record occurred in the local or regional area within the first 3 hours of the event. Between 1980 and 2017 there were 34 local or regional confirmed tsunamis that resulted in deaths and property damage (Table 2); 24 of these were in the Pacific and its adjacent seas.

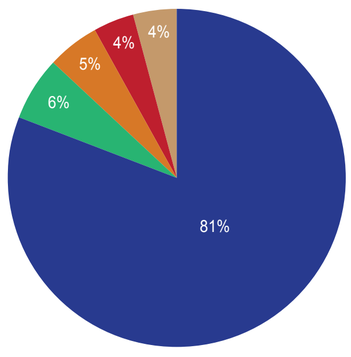
A distant or teletsunami is a tsunami originating from a far away source, generally more than 1,000 km (621 miles) or more than 3 hours tsunami travel time away. They usually start as a local tsunami that causes extensive destruction near the source; the waves then continue to travel across the entire ocean basin with sufficient energy to cause additional deaths and destruction on distant shores. In the last 300 years, there have been at least 43 confirmed damaging teletsunamis and 18 caused deaths more than 1,000 km (621 miles) from the source (Table 3).

The events in the NCEI Global Historical Tsunami Database were gathered from the NOAA Tsunami Warning Centers, NOAA National Data Buoy Center, NOAA National Ocean Service, UNESCO/IOC-NOAA International Tsunami Information Center, NOAA Pacific Marine Environmental Laboratory, U.S. Geological Survey, national and government databases and reports, tsunami catalogs, post-event reconnaissance reports, journal articles, newspapers, internet sources, email, and other written documents. This compilation does not include sources inferred from the study of tsunami deposits. Tsunami deposits are the physical evidence left behind when a tsunami impacts a shoreline or affects submarine sediments. For a complete listing of references used in compiling the database, please visit: http://www.ngdc.noaa.gov/hazard/.

Global distribution of confirmed tsunami sources



Distribution of confirmed tsunamis by generation mechanism



United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

ICSU WORLD DATA SYSTEM

International Tsunami Information Center
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Table 1. Regional and local tsunamis causing 2,000 or more deaths

Year	Date Mon	Day	Source Location	Estimated Dead or Missing
365	7	21	Crete, Greece	5,000
887	8	2	Niigata, Japan	2,000
1341	10	31	Aomori Prefecture, Japan	2,600
1498	9	20	Enshunada Sea, Japan	5,000
1570	2	8	Central Chile	2,000
1605	2	3	Nankaido, Japan	5,000
1611	12	2	Sanriku, Japan	5,000
1674	2	17	Banda Sea, Indonesia	2,244
1687	10	20	Southern Peru	*5,000
1692	6	7	Port Royal, Jamaica	2,000
1703	12	30	Boso Peninsula, Japan	*5,233
1707	10	28	Enshunada Sea, Japan	2,000
1707	10	28	Nankaido, Japan	*5,000
1741	8	29	Hokkaido, Japan	2,000
1746	10	29	Central Peru	4,800
1751	5	20	Northwest Honshu, Japan	2,100
1755	11	1	Lisbon, Portugal	*50,000
1771	4	24	Ryukyu Islands, Japan	13,486
1792	5	21	Kyushu Island, Japan**	14,524
1854	12	24	Nankaido, Japan	*3,000
1868	8	13	Northern Chile*	25,000
1877	5	10	Northern Chile	2,282
1883	8	27	Krakatau, Indonesia**	34,417
1896	6	15	Sanriku, Japan	*27,122
1899	9	29	Banda Sea, Indonesia	*2,460
1908	12	28	Messina Strait, Italy	2,000
1923	9	1	Sagami Bay, Japan	2,144
1933	3	2	Sanriku, Japan	3,022
1945	11	27	Makran Coast, Pakistan	*4,000
1952	11	4	Kamchatka, Russia	10,000
1960	5	22	Southern Chile	2,000
1976	8	16	Moro Gulf, Philippines	6,800
2004	12	26	Banda Aceh, Indonesia	*^227,899
2011	3	11	Tohoku, Japan	*^18,453
			Total	**505,586**

* May include earthquake deaths
** Tsunami generated by volcanic eruption
^ Includes dead/mising near and outside source region

Table 2. Regional and local tsunamis causing deaths since 1980

Year	Date Mon	Day	Source Location	Estimated Dead or Missing
1981	9	1	Samoa Islands	Few
1983	5	26	Noshiro, Japan	100
1988	8	10	Solomon Islands	1
1991	4	22	Limon, Costa Rica	2
1992	9	2	Off coast Nicaragua	170
1992	12	12	Flores Sea, Indonesia	1,169
1993	7	12	Sea of Japan	208
1994	6	2	Java, Indonesia	238
1994	10	8	Halmahera, Indonesia	1
1994	11	4	Skagway Alaska, USA**	1
1994	11	14	Philippine Islands	*81
1995	5	14	Timor, Indonesia	11
1995	10	9	Manzanillo, Mexico	1
1996	1	1	Sulawesi, Indonesia	9
1996	2	17	Irian Jaya, Indonesia	110
1996	2	21	Northern Peru	12
1998	7	17	Papua New Guinea	1,636
1999	8	17	Izmit Bay, Turkey	155
1999	11	26	Vanuatu Islands	5
2001	6	23	Southern Peru	26
2004	12	26	Banda Aceh, Indonesia	*^227,899
2006	3	14	Seram Island, Indonesia	4
2006	7	17	Java, Indonesia	802
2007	4	1	Solomon Islands	50
2007	4	21	Southern Chile	8
2007	8	15	Southern Peru	3
2009	9	29	Samoa Islands	192
2010	1	12	Haiti	7
2010	2	27	Southern Chile	156
2010	10	25	Mentawai, Indonesia	431
2011	3	11	Tohoku, Japan	*^18,453
2013	2	6	Solomon Islands	10
2015	9	16	Central Chile	8
2017	6	17	Greenland**	4
			Total	**251,959**

* May include earthquake deaths
** Tsunami generated by landslide
^ Includes dead/missing near and outside source region

Table 3. Tsunamis causing deaths greater than 1000 km from the source location

Year	Date Mon	Day	Source Location	Estimated Dead or Missing Local	Distant	Distant locations that reported casualties
1700	1	27	Cascadia Subduction Zone, USA		2	Japan
1755	11	1	Lisbon, Portugal	50,000	3	Brazil
1837	11	7	Southern Chile	0	16	USA (Hawaii)
1868	8	13	Northern Chile**	*25,000	7	New Zealand, Samoa, Southern Chile
1877	5	10	Northern Chile	277	2,005	Fiji, Japan, Peru, USA (Hawaii)
1883	8	27	Krakatau, Indonesia	34,417	1	Sri Lanka
1899	1	15	Papua New Guinea	0	Hundreds	Caroline Islands, Solomon Islands
1901	8	9	Loyalty Islands, New Caledonia	0	Several	Santa Cruz Islands
1923	2	3	Kamchatka, Russia	2	1	USA (Hawaii)
1945	11	27	Makran coast, Pakistan	*4,000	11	India
1946	4	1	Unimak Island, Alaska, USA	5	162	Marquesas Is, Peru, USA (California, Hawaii)
1957	3	9	Andreanof Islands, Alaska, USA	0	2	USA (Hawaii, indirect deaths from plane crash doing tsunami reconnaissance)
1960	5	22	Central Chile	2,000	226	Japan, Philippines, USA (California, Hawaii)
1964	3	28	Prince William Sound, Alaska, USA	106	18	USA (California, Oregon)
2004	12	26	Banda Aceh, Indonesia***	*175,827	52,072	Bangladesh, India, Kenya, Madagascar, Maldives, Myanmar, Seychelles, Somalia, South Africa, Sri Lanka, Tanzania, Yemen
2005	3	28	Sumatra, Indonesia	0	10	Sri Lanka (deaths during evacuation)
2011	3	11	Tohoku, Japan	*18,451	2	Indonesia, USA (California)
2012	10	28	Haida Gwaii, Canada	0	1	USA (Hawaii, death during evacuation)

*May include earthquake deaths **Local and regional deaths in Chile and Peru ***Local and regional deaths in Indonesia, Malaysia, and Thailand